

Listing of Claims:

The following listing of claims is provided for the convenience of the Examiner. No amendments to the claims are made in this paper.

1 1. (Original) A method for investigating an image set of geophysical data
2 distributed over a first N -dimensional volume where $N \geq 2$, the method comprising:
3 selecting a subvolume of a target set of geophysical data distributed over a second
4 N -dimensional volume, the subvolume enclosing a known feature of interest; and
5 at each of a plurality of positions within the first N -dimensional volume,
6 calculating a cross-correlation between the data distributed within the subvolume and
7 corresponding data distributed in the first N -dimensional volume about the each of the plurality
8 of positions.

1 2. (Original) The method recited in claim 1 further comprising displaying
2 for a user a distribution of results of calculating the cross-correlation throughout the first N -
3 dimensional volume.

1 3. (Original) The method recited in claim 1 further comprising:
2 modifying the subvolume in accordance with a user instruction; and
3 at each of a plurality of positions within the first N -dimensional volume,
4 calculating a cross-correlation between the data distributed within the modified subvolume and
5 corresponding data distributed in the first N -dimensional volume about the each of the plurality
6 of positions.

1 4. (Original) The method recited in claim 3 wherein modifying the
2 subvolume comprises changing a size of the subvolume.

1 5. (Original) The method recited in claim 3 wherein modifying the
2 subvolume comprises changing a shape of the subvolume.

1 6. (Original) The method recited in claim 1 wherein:

2 each of the image set and the target set consists of real data, the method further
3 comprising respectively transforming the real data of the image and target sets to complex data
4 by performing a Hilbert transform of the real data; and

5 calculating the cross-correlation comprises calculating a complex cross-
6 correlation between the transformed data distributed within the subvolume and corresponding
7 transformed data distributed in the first N -dimensional volume about the each of the plurality of
8 positions.

1 7. (Original) The method recited in claim 6 further comprising calculating
2 an amplitude envelope and phase distribution from the complex cross-correlation over the first
3 N -dimensional volume.

1 8. (Original) The method recited in claim 1 wherein:
2 each of the image set and the target set consists of real data; and
3 calculating the cross-correlation comprises calculating a real cross-correlation.

1 9. (Original) The method recited in claim 1 further comprising normalizing
2 the data distributed within the subvolume over the subvolume prior to calculating the cross-
3 correlation.

1 10. (Original) The method recited in claim 1 wherein $N = 3$.

1 11. (Original) The method recited in claim 1 wherein $N = 4$.

1 12. (Original) The method recited in claim 1 wherein the image and target
2 sets comprise seismic data.

1 13. (Original) The method recited in claim 1 wherein the image and target
2 sets comprise mathematical transforms of seismic data.

1 14. (Original) The method recited in claim 1 wherein the image and target
2 sets comprise prestack data.

1 15. (Original) The method recited in claim 1 wherein the image set is the
2 target set.

1 16. (Original) The method recited in claim 1 wherein the subvolume is a
2 parallelepiped.

1 17. (Original) A method for investigating an image set of real geophysical
2 data distributed over a first N -dimensional volume where $N \geq 2$ according to a known feature of
3 interest identified in a target set of real geophysical data distributed over a second N -dimensional
4 volume, the method comprising:

5 transforming the real geophysical data of the first N -dimensional volume to
6 complex data by performing a Hilbert transform on the real geophysical data of the first N -
7 dimensional volume;

8 transforming the real geophysical data of the second N -dimensional volume to
9 complex data by performing a Hilbert transform on the real geophysical data of the second N -
10 dimensional volume;

11 selecting a subvolume of the target set that encloses the known feature of interest
12 in accordance with a user instruction; and

13 at each of a plurality of positions within the first N -dimensional volume,
14 calculating a complex cross-correlation between the transformed data within the subvolume and
15 corresponding transformed data distributed in the first N -dimensional volume about the each of
16 the plurality of positions.

1 18. (Original) The method recited in claim 17 further comprising:
2 modifying the subvolume in accordance with another user instruction; and
3 at each of a plurality of positions within the first N -dimensional volume,
4 calculating a complex cross-correlation between the transformed data within the modified
5 subvolume and corresponding transformed data distributed in the first N -dimensional volume
6 about the each of the plurality of positions.

1 19. (Original) The method recited in claim 17 further comprising normalizing
2 the transformed data distributed within the subvolume over the subvolume prior to calculating
3 the complex cross-correlation.

1 20. (Original) The method recited in claim 17 wherein the image set is the
2 target set.

1 21. (Original) A computer-readable storage medium having a computer-
2 readable program embodied therein for directing operation of a computer system including an
3 input device, a processor, and a display device, wherein the computer-readable program includes
4 instructions for operating the computer system for investigating geophysical data in accordance
5 with the following:

6 receiving, with the input device, an image set of geophysical data distributed over
7 a first N -dimensional volume where $N \geq 2$;

8 receiving, with the input device, a target set of geophysical data distributed over a
9 second N -dimensional volume;

10 receiving, with the input device, a first user instruction identifying a subvolume of
11 the target set that encloses a known feature of interest; and

12 calculating, with the processor at each of a plurality of positions within the first
13 N -dimensional volume, a cross-correlation between the data distributed within the subvolume
14 and corresponding data distributed in the first N -dimensional volume about the each of the
15 plurality of positions.

1 22. (Original) The computer-readable storage medium recited in claim 21
2 wherein the computer-readable program further includes instructions for displaying, for a user
3 with the display device, a distribution of results of calculating the cross-correlation throughout
4 the first N -dimensional volume.

1 23. (Original) The computer-readable storage medium recited in claim 21
2 wherein the computer-readable program further includes:

3 instructions for receiving, with the input device, a second user instruction to
4 modify the subvolume; and

5 instructions for calculating, with the processor at each of a plurality of positions
6 within the first N -dimensional volume, a cross-correlation between the data distributed within the
7 modified subvolume and corresponding data distributed in the first N -dimensional volume about
8 the each of the plurality of positions.

1 24. (Original) The computer-readable storage medium recited in claim 21
2 wherein:

3 each of the image set and the target set consists of real data, the computer-
4 readable program further including instructions for respectively transforming the real data of the
5 image and target sets to complex data by performing a Hilbert transform of the real data; and
6 the instructions for calculating the cross-correlation comprise instructions for
7 calculating a complex cross-correlation between the transformed data distributed within the
8 subvolume and corresponding transformed data distributed in the first N -dimensional volume
9 about the each of the plurality of positions.

1 25. (Original) The computer-readable storage medium recited in claim 24
2 wherein the computer-readable program further includes instructions for calculating an
3 amplitude envelope and phase distribution from the complex cross-correlation over the first N -
4 dimensional volume.

1 26. (Original) The computer-readable storage medium recited in claim 21
2 wherein the computer-readable program further includes instructions for normalizing, with the
3 processor, the data distributed within the subvolume prior to calculating the cross-correlation.